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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/040,526	12/28/2001	Wayne V. Sorin	005489.P010	9112

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EXAMINER

WONG, ERIC K

ART UNIT PAPER NUMBER

2874

DATE MAILED: 06/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/040,526

Applicant(s)

SORIN ET AL.

Examiner

Eric Wong

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6. 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 10, 31, 32, 33, 34 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent Number 6,181,840 to Huang et al.

As to claims 1, 2, 31, 34, 35 Huang discloses a method comprising:

- Microbending a fiber Bragg grating with a transverse acoustic wave; and reflecting one or more Nth order sidebands of reflection wavelengths with the fiber Bragg grating to couple a band of wavelengths within an optical signal from a first mode to a second mode (Figures 1-4 and Column 3, Lines 8-31)
- Generating the transverse acoustic wave at a first frequency and a first signal strength; and transmitting the transverse acoustic wave to an optical waveguide having an interaction region containing the fiber Bragg grating (26, Figure 4)

As to claim 10, given the acousto-optic reflector of Huang, it would be inherent that an optical fiber that has a microbend and a transverse acoustic wave will simultaneously compress and strain a portion of the fiber Bragg grating.

As to claim 32, the optical waveguide contains a tapered region and the interaction region is located within the tapered region (Figure 4).

Art Unit: 2874

As to claim 33, the acoustic wave exciter comprises one or more acoustic wave exciters cascaded in series along the optical waveguide.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3-4, 6-9, 11-12 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 6,181,840 to Huang et al. as applied to claim 1 above.

As to claim 4 and 37, Huang discloses an acousto-optic reflector with a microbend and transverse acoustic wave generating means, but fails to explicitly disclose a transverse acoustic wave spectrally shaping the forward signal by selectively removing one or more portions of the optical spectrum contained in the optical signal and transmitting the transverse acoustic wave to spectrally shape the forward optical signal.

It is well known in the art of acoustically modulated fiber Bragg gratings that transmitting a transverse acoustic wave would shape and modulate an optical signal to provide filtering and spectrally shaping the forward optical signal.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to recognize that acoustically modulated fiber Bragg gratings that transmitting a transverse acoustic wave would inherently shape and modulate an optical signal to provide filtering and spectrally shaping the forward optical signal.

As to claims 6-9, Huang discloses an acousto-optic microbent reflector in an optical fiber with a core and a transverse acoustic wave for the purposes of coupling, but fails to explicitly disclose an optical fiber that has a core, cladding, and polarization mode with each spatial mode coupled from a first propagation mode to a second propagation mode.

It is well known in the art that an optical fiber that is subject to a transverse acoustic wave would have a core, cladding and polarization mode as an inherent property. And when coupled, would comprise transitioning energy from one spatial mode to another.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to recognize that acoustically modulated optical fiber with Bragg gratings would inherently have a core, cladding and polarization mode. And when coupled, would comprise transitioning energy from one spatial mode to another.

As to claims 11 and 12, Huang discloses an acousto-optic microbent reflector in an optical fiber with a core and a transverse acoustic wave for the purposes of coupling, but fails to explicitly disclose an acoustically modulated fiber that has spacing of sidebands and percentage of reflected sidebands directly corresponding to a first frequency and signal strength of an acoustic wave.

It is well known in the art that by using transverse acoustic waves with a first frequency and strength on a grating there would be an inherent property that sidebands and percentage of reflected sidebands directly correspond to a first frequency and signal strength of an acoustic wave.

Art Unit: 2874

5. Claims 3 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang as applied to claims 1 and 34 above, and further in view of United States Patent Number 5,982,963 to Feng et al.

Huang discloses a means for separating an optical signal traveling in a first direction into a forward optical signal and a reflected optical signal and a means for transmitting the transverse acoustic waves and reflected optical signals, but fails to explicitly disclose a means for routing said signals.

Feng teaches a tunable grating using an acoustic wave and an optical circulator that routes reflected signals (Figure 4) in order to monitor the reflected signal.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify Huang to include the optical circulator of Feng to route reflected signals for monitoring.

6. Claims 13-25 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang, and further in view of United States Patent Number 6,430,342 to Kim et al.

Huang discloses an acousto-optic apparatus comprising:

- As to claims 13-15, an optical waveguide having an interaction region containing a fiber Bragg grating, a cladding, a core and an acoustic wave exciter,
- As to claim 16, a fiber Bragg grating that is continuous from a first portion to a second portion; and
- As to claims 18-20, said exciter includes an acoustic wave amplifying member, a signal generator comprising a transducer (20) and an acoustic wave generator comprising an acoustic horn (22, Figure 4)

Art Unit: 2874

- As to claims 22-23, see rejection for claims 3 and 36 above.
- As to claim 24-25, please see rejections to claim 4 above.
- As to claim 29-30, the wave exciter generates both compressional and transverse waves.
- But fails to explicitly disclose an offset core.

Kim teaches an acousto-optic apparatus that can use various types of optical fiber (Column 5, Lines 19-28) including a single mode, jacket encased dispersion compensation fiber with a section removed which inherently would have an offset core.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify Huang to include an single mode offset core optical fiber taught by Kim in order to better manage polarization and prevent losses from optical transmission. A removed jacket portion helps to assist in microbending.

Claims 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang, and further in view of United States Patent Number 6,430,342 to Kim et al.

Huang and Kim disclose acousto-optic modulated signal devices, but fails to explicitly disclose an acoustic wave absorber and heat sink affixed to said absorber.

One skilled in the art of acoustically modulated signals would be able to add an absorber and heat sink in order to dissipate unwanted acoustic waves and heat to reduce disturbances to the light input.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Art Unit: 2874

- a. United States Patent Number 5,708,736 to Steinblatt for an optical waveguide mode coupler using acoustic waves.
- b. United States Patent Application Publication 2003/0021510 to Satorious for an acousto-optic bandpass filter.
- c. United States Patent Application Publication 2002/0021853 to Nakazawa et al. for a fiber grating with a acoustic wave absorbers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Wong whose telephone number is 703-305-4741. The examiner can normally be reached on Monday through Friday, 830AM - 430PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 703-308-4819. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-0725 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

EW
April 25, 2003

Application/Control Number: 10/040,526

Page 8

Art Unit: 2874

EW

April 24, 2003



HEMANG SANGHAVI
PRIMARY EXAMINER